Remarks: General

Applicant wishes to thank the Examiner for scheduling the time to conduct a personal interview in this application.

The claims have been amended by rewriting Claims 81, 87 and 94; canceling Claims 1~80, 83 and 91 without prejudice to or disclaimer of the subject matter thereof; and adding new Claims 95~184. No new matter is added by these amendments.

Various words, phrases and textual passages that were not present in the claims as originally filed have been added by amendment to certain existing claims and have been introduced in the new claims. Basis in the specification for those words, phrases and textual passages is as follows:

in Claims 81, 87, 94, 115, 120, 134, 139, 153, 167 and 171, support for the recitation as to heating to a temperature above 500°C may be found in the discussion on page 22 at line 19 to page 20 at line 10;

in Claims 81, 87, 115, 134, 153 and 167, support for the recitation of a step of inputting may be found on page 19 at line 22;

in Claims 81, 87 and 115, support for the recitation as to a baseline response value, a comparison response value and a reference gas value may be found in the discussion on page 24 at lines 4~26;

in Claims 81, 87, 115, 134, 153 and 167, support for the recitation of a pattern recognition technique may be found in the discussion on page 13 at line 10;

in Claims 95~98, 106~109, 124~127, 143~146, 157~160 and 175~178, support for the recitation as to the specific materials may be found on page 14 at line 32 to page 17 at line 37;

in Claims 99~102, 110~113, 128~131, 147~150, 161~164 and 179~182, support for the recitation as to the specific component gases may be found on page 11 at lines 4~7 and on page 12 at lines 24~30;

in Claims 103, 114, 133, 152, 166 and 184, support for the recitation as to the gas mixture sources may be found on page 11 at lines 20~24;

in Claims 115, 134, 153 and 167, support for the recitation as to steps of detecting a response and directly measuring the response may be found on page 3 at lines 13~19; and

in Claims 134, 153 and 167, support for the recitation as to inputting only the electrical responses of the chemo/electro-active materials may be found on page 24 at line 21.

New Claims 104, 121, 140 and 172 correspond essentially to original Claim 72.

New Claims 105, 116, 135 and 168 correspond essentially to original Claim 76.

New Claims 117, 136 and 154 correspond essentially to original Claim 84.

New Claims 118, 137 and 155 correspond essentially to original Claim 85.

New Claims 119, 138 and 170 correspond essentially to original Claim 88.

New Claims 120, 139 and 171 correspond essentially to original Claim 94.

New Claims 122, 141 and 173 correspond essentially to original Claim 90.

New Claims 123, 142 and 156 correspond essentially to original Claim 86.

New Claims 132, 151 and 165 correspond essentially to original Claim 82.

New Claim 169 corresponds essentially to original Claim 92.

New Claim 174 corresponds essentially to original Claim 93.

New Claim 183 corresponds essentially to original Claim 89.

The amendments to Claims 81, 87 and 94 have been made for the purpose of removing from the scope thereof the sensor system disclosed by US 5,832,411.

A supplemental Information Disclosure Statement ("IDS") pursuant to 37 CFR §1.98 is enclosed, for which the fee stated in §1.17(p) is due by reason of §1.97(c)(2). Please charge this fee to Deposit Account No. 04-1928 (E.I. du Pont de Nemours and Company).

A petition under 37 CFR §1.136 for a two-month extension of time to respond the Examiner's action is enclosed, the fee for which should be charged to Deposit Account No. 04-1928.

The fees due by reason of the addition of Claims 95~184 are calculated on the attached sheet and may be charged to Deposit Account No. 04-1928. The cancellation of Claims 1~80, 83 and 91 has been taken into account in the calculation of the fees. If the calculation on the attached sheet is in error, please charge or credit Deposit Account No. 04-1928 accordingly.

If any fee other than or in addition to those mentioned specifically above is required to authorize or obtain consideration of this response and the enclosed IDS, please charge such fee to Deposit Account No. 04-1928.

Claims 81, 82, 84~90 and 92~184 are now active in the application. Applicant hereby requests reconsideration and further examination of the application in view of the reasons it has set forth below for allowance of the claims.

Remarks: Detailed Action

I.

In Item 1, the Examiner has rejected Claims 1~39 and 52~94 under 35 U.S.C. §102(b) as being anticipated by US 5,832,411 ("Schatzmann"). Claims 1~39, 52~80, 83 and 91 have been canceled.

Schatzmann discloses a system for monitoring compounds in a fluid at multiple points distributed over an area of interest and computing their spatial and temporal properties. The monitoring system includes a plurality of sensor arrays that are coupled to respective sensor units and provide them with raw data in response to the presence of selected compounds in the ambient fluid.

Schatzmann discloses that a temperature sensor may measure the temperature of the sensor array, and that a processor uses this information to control a heater that adjusts the temperature of the sensor array.[1] This arrangement is in the context, however, of an embodiment in which temporal changes in the performance of the sensor elements are compensated for by exposing the sensor elements to a calibration vapor. The computed local profile is then compared to the calibration vapor's known profile, and the error is used to adjust the computational parameters in the signal conditioning algorithm.[2]

Schatzmann thus does disclose the use of an array of sensors. It does not, however, teach or suggest that the array of sensors is heated to a temperature above 500°C in

> a method in which electrical responses of chemo/electro-active materials, but not a baseline response value, a comparison response value or a reference gas value, are inputted to a pattern recognition technique (as now required by Claims 81 and 87, and as required by 115), or
>
> a method in which only electrical responses of chemo/electro-active materials are inputted to a pattern recognition technique (as required by Claims 134, 153 and 167).

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[1] Column 8, lines 20~23.
[2] Column 8, lines 2~10.

In view of the distinctions as discussed above between Schatzmann and the subject matter of Claims 81, 87, 115, 134, 153 and 167, Applicant respectfully requests that the Examiner withdraw the rejection of Claims 81, 82, 84~90 and 92~94 under 35 U.S.C. §102(b).

II.

In Item 2, the Examiner has rejected Claims 40~51 under 35 U.S.C. §103(a) as being unpatentable over Schatzmann in view of WO 93/08467 ("McGeehin"). Claims 40~51 have been canceled.

III.

Applicant has reviewed the reference that has been made of record but is not relied on, and submits that it is of no greater pertinence to the amended and new claims than the references discussed above.

In view of the foregoing, Applicant submits that all of the Examiner's objections and rejections have been properly traversed, and that the pending claims are in condition for allowance, request for which is hereby respectfully made.

Respectfully submitted,

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Appendix A

(i) Amendments
in marked-up form to
Claims 81, 87 and 94,

(ii) New Claims 95~184, and

(iii) Status of all other claims

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1 to 80. (canceled).

81. (currently amended) A method for calculating the concentration of at least two individual analyte gas components in a multi-component gas mixture having a temperature of about 400°C or more, comprising:

(a) providing within the gas mixture an array of at least three chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure to each of the individual analyte gas components than each of the other chemo/electro-active materials, wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more,

(i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and

(ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

(b) heating the array to a temperature above 500°C;

(~~b~~c) determining an electrical response of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture; ~~and~~

(d) inputting the electrical responses of the chemo/electro-active materials, but not a baseline response value, a comparison response value or a reference gas value, to a pattern recognition technique; and

(~~c~~e) calculating the concentration of each of the individual analyte gas components from the ~~electrical responses of the~~

~~chemo/electro-active materials upon exposure to the multi-component gas mixture only~~ inputs in step (d).

82. (original) A method according to Claim 81 wherein the gas mixture is an emission from a combustion process.

83. (canceled).

84. (original) A method according to Claim 81 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

85. (original) A method according to Claim 81 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

86. (original) A method according to Claim 81 wherein at least one chemo/electro-active material is a metal oxide.

87. (currently amended) A method for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) providing an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

(b) heating the array to a temperature above 500°C;

(~~b~~c) determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture; ~~and~~

(d) inputting the electrical responses of the chemo/electro-active materials, but not a baseline response value, a comparison response value or a reference gas value, to a pattern recognition technique; and

(~~c~~e) performing an analysis of the individual gas component from the ~~electrical response values~~inputs in step (d).

88. (original) A method according to Claim 87 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

89. (original) A method according to Claim 87 wherein the gas mixture is an emission from a combustion process.

90. (original) A method according to Claim 87 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

91. (canceled).

92. (original) A method according to Claim 87 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

93. (original) A method according to Claim 87 wherein at least one chemo/electro-active material is a metal oxide.

94. (currently amended) A method according to Claim 87 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature ~~of about 4~~above 500°C ~~or more~~.

95. (new) A method according to Claim 86 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

96. (new) A method according to Claim 86 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

97. (new) A method according to Claim 86 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x

with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$, $Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$,

$Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

98. (new) A method according to Claim 86 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iii) the first material is $M^1{}_aM^2{}_bO_x$, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1{}_aM^2{}_bO_x$, and the second material is a second $M^1{}_aM^2{}_bO_x$; and

(vi) the first material is a first $M^1{}_aM^2{}_bM^3{}_cO_x$, and the second material is a second $M^1{}_aM^2{}_bM^3{}_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb,. Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

99. (new) A method according to Claim 81 wherein the gas mixture comprises one or more members of the group consisting of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

100. (new) A method according to Claim 81 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

101. (new) A method according to Claim 81 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

102. (new) A method according to Claim 81 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

103. (new) A method according to Claim 81 wherein the gas mixture is provided from a manufacturing process, a waste stream, environmental monitoring, or a medical, agricultural, food or beverage operation.

104. (new) A method according to Claim 87 wherein the component gases in the mixture are not separated.

105. (new) A method according to Claim 87 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure.

106. (new) A method according to Claim 93 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

107. (new) A method according to Claim 93 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

108. (new) A method according to Claim 93 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$, $Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive,

$Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

109. (new) A method according to Claim 93 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iii) the first material is $M^1{}_aM^2{}_bO_x$, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1{}_aM^2{}_bO_x$, and the second material is a second $M^1{}_aM^2{}_bO_x$; and

(vi) the first material is a first $M^1{}_aM^2{}_bM^3{}_cO_x$, and the second material is a second $M^1{}_aM^2{}_bM^3{}_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1_aM^2_bM^3_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

110. (new) A method according to Claim 87 wherein the gas mixture comprises one or more members of the group consisting of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

111. (new) A method according to Claim 87 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

112. (new) A method according to Claim 87 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

113. (new) A method according to Claim 87 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

114. (new) A method according to Claim 87 wherein the gas mixture is provided from a manufacturing process, a waste stream, environmental monitoring, or a medical, agricultural, food or beverage operation.

115. (new) A method for directly sensing gas components in a multi-component gas system, comprising

(a) exposing a chemical sensor comprising an array of at least two chemo/electro-active materials to a multi-component gas system;

(b) heating the array to a temperature above 500°C;

(c) detecting a response;

(d) directly measuring the response of each chemo/electro-active material;

(e) inputting the electrical responses of the chemo/electro-active materials, but not a baseline response value, a comparison response value or a reference gas value, to a pattern recognition technique; and

(f) detecting the presence of and/or calculating the concentration of one or more individual analyte gas components in the system from the inputs in step (e).

116. (new) A method according to Claim 115 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

117. (new) A method according to Claim 115 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

118. (new) A method according to Claim 115 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

119. (new) A method according to Claim 115 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

120. (new) A method according to Claim 115 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature above 500°C.

121. (new) A method according to Claim 115 wherein the component gases in the gas mixture are not separated.

122. (new) A method according to Claim 115 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

123. (new) A method according to Claim 115 wherein at least one chemo/electro-active material is a metal oxide.

124. (new) A method according to Claim 123 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

125. (new) A method according to Claim 123 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1_aM^2_bM^3_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

126. (new) A method according to Claim 123 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1_aM^2_bO_x$, and $M^1_aM^2_bM^3_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1_aM^2_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$,

$Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$, $Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

127. (new) A method according to Claim 123 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iii) the first material is $M^1{}_aM^2{}_bO_x$, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1_aM^2_bO_x$, and the second material is a second $M^1_aM^2_bO_x$; and

(vi) the first material is a first $M^1_aM^2_bM^3_cO_x$, and the second material is a second $M^1_aM^2_bM^3_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1_aM^2_bM^3_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

128. (new) A method according to Claim 115 wherein the gas mixture comprises one or more members of the group consisting of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

129. (new) A method according to Claim 115 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

130. (new) A method according to Claim 115 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

131. (new) A method according to Claim 115 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

132. (new) A method according to Claim 115 wherein the gas mixture is an emission from a combustion process.

133. (new) A method according to Claim 115 wherein the gas mixture is provided from a manufacturing process, a waste stream, environmental monitoring, or a medical, agricultural, food or beverage operation.

134. (new) A method for directly sensing gas components in a multi-component gas system, comprising

(a) exposing a chemical sensor comprising an array of at least two chemo/electro-active materials to a multi-component gas system;

(b) heating the array to a temperature above 500°C;

(c) detecting a response;

(d) directly measuring the response of each chemo/electro-active material;

(e) inputting only the electrical responses of the chemo/electro-active materials to a pattern recognition technique; and

(f) detecting the presence of and/or calculating the concentration of one or more individual analyte gas components in the system from the inputs in step (e).

135. (new) A method according to Claim 134 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

136. (new) A method according to Claim 134 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

137. (new) A method according to Claim 134 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

138. (new) A method according to Claim 134 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

139. (new) A method according to Claim 134 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature above 500°C.

140. (new) A method according to Claim 134 wherein the component gases in the gas mixture are not separated.

141. (new) A method according to Claim 134 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

142. (new) A method according to Claim 134 wherein at least one chemo/electro-active material is a metal oxide.

143. (new) A method according to Claim 142 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

144. (new) A method according to Claim 142 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm,

V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

145. (new) A method according to Claim 142 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$,

$Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

146. (new) A method according to Claim 142 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iii) the first material is $M^1{}_aM^2{}_bO_x$, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1{}_aM^2{}_bO_x$, and the second material is a second $M^1{}_aM^2{}_bO_x$; and

(vi) the first material is a first $M^1_aM^2_bM^3_cO_x$, and the second material is a second $M^1_aM^2_bM^3_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1_aM^2_bM^3_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

147. (new) A method according to Claim 134 wherein the gas mixture comprises one or more members of the group consisting of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

148. (new) A method according to Claim 134 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

149. (new) A method according to Claim 134 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

150. (new) A method according to Claim 134 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

151. (new) A method according to Claim 134 wherein the gas mixture is an emission from a combustion process.

152. (new) A method according to Claim 134 wherein the gas mixture is provided from a manufacturing process, a waste

stream, environmental monitoring, or a medical, agricultural, food or beverage operation.

153. (new) A method for calculating the concentration of at least two individual analyte gas components in a multi-component gas mixture having a temperature of about 400°C or more, comprising:

(a) providing within the gas mixture an array of at least three chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure to each of the individual analyte gas components than each of the other chemo/electro-active materials, wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more,

(i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and

(ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

(b) heating the array to a temperature above 500°C;

(c) determining an electrical response of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture;

(d) inputting only the electrical responses of the chemo/electro-active materials to a pattern recognition technique; and

(e) calculating the concentration of each of the individual analyte gas components from the inputs in step (d).

154. (new) A method according to Claim 153 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

155. (new) A method according to Claim 153 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

156. (new) A method according to Claim 153 wherein at least one chemo/electro-active material is a metal oxide.

157. (new) A method according to Claim 156 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

158. (new) A method according to Claim 156 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

159. (new) A method according to Claim 156 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$, $Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

160. (new) A method according to Claim 156 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1_aM^2_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1_aM^2_bM^3_cO_x$;

(iii) the first material is $M^1_aM^2_bO_x$, and the second material is $M^1_aM^2_bM^3_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1_aM^2_bO_x$, and the second material is a second $M^1_aM^2_bO_x$; and

(vi) the first material is a first $M^1_aM^2_bM^3_cO_x$, and the second material is a second $M^1_aM^2_bM^3_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1_aM^2_bM^3_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

161. (new) A method according to Claim 153 wherein the gas mixture comprises one or more members of the group consisting

of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

162. (new) A method according to Claim 153 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

163. (new) A method according to Claim 153 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

164. (new) A method according to Claim 153 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

165. (new) A method according to Claim 153 wherein the gas mixture is an emission from a combustion process.

166. (new) A method according to Claim 153 wherein the gas mixture is provided from a manufacturing process, a waste stream, environmental monitoring, or a medical, agricultural, food or beverage operation.

167. (new) A method for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) providing an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

(b) heating the array to a temperature above 500°C;

(c) determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture;

(d) inputting only the electrical responses of the chemo/electro-active materials to a pattern recognition technique; and

(e) performing an analysis of the individual gas component from the inputs in step (d).

168. (new) A method according to Claim 167 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure.

169. (new) A method according to Claim 167 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

170. (new) A method according to Claim 167 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

171. (new) A method according to Claim 167 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature above 500°C.

172. (new) A method according to Claim 167 wherein the component gases in the mixture are not separated.

173. (new) A method according to Claim 167 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

174. (new) A method according to Claim 167 wherein at least one chemo/electro-active material is a metal oxide.

175. (new) A method according to Claim 174 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1, M^2 and M^3 are metals that form stable oxides when fired in the presence of oxygen above 500°C;

M^1 is selected from Periodic Groups 2-15 and the lanthanide group;

M^2 and M^3 are independently selected from Periodic Groups 1-15 and the lanthanide group;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

176. (new) A method according to Claim 174 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm,

V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

177. (new) A method according to Claim 174 wherein the chemo/electro-active materials comprise one or more members of the group consisting of M^1O_x, $M^1{}_aM^2{}_bO_x$, and $M^1{}_aM^2{}_bM^3{}_cO_x$ wherein

M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

$M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$,

$Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and

$M^1_aM^2_bM^3_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$, $Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$;

a, b, and c are each independently in the range of about 0.0005 to about 1, provided that $a+b+c = 1$; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

178. (new) A method according to Claim 174 wherein the chemo/electro-active materials comprise first and second chemo/electro-active materials selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1_aM^2_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1_aM^2_bM^3_cO_x$;

(iii) the first material is $M^1_aM^2_bO_x$, and the second material is $M^1_aM^2_bM^3_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1_aM^2_bO_x$, and the second material is a second $M^1_aM^2_bO_x$; and

(vi) the first material is a first $M^1{}_aM^2{}_bM^3{}_cO_x$, and the second material is a second $M^1{}_aM^2{}_bM^3{}_cO_x$;

wherein

M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr;

M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$;

a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and

x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound.

179. (new) A method according to Claim 167 wherein the gas mixture comprises one or more members of the group consisting of oxygen, carbon monoxide, a nitrogen oxide, a hydrocarbon, CO_2, H_2S, sulfur dioxide, a halogen, hydrogen, water vapor, ammonia, alcohol, a solvent vapor, an ether, a ketone, an aldehyde, a carbonyl, and a microorganism.

180. (new) A method according to Claim 167 wherein the gas mixture comprises one or more members of the group consisting of oxygen, a nitrogen oxide, a hydrocarbon, and ammonia.

181 . (new) A method according to Claim 167 wherein the gas mixture comprises one or more members of the group consisting of a nitrogen oxide and ammonia.

182. (new) A method according to Claim 167 wherein the gas mixture comprises one or more members of the group consisting of oxygen and a hydrocarbon.

183. (new) A method according to Claim 167 wherein the gas mixture is an emission from a combustion process.

184. (new) A method according to Claim 167 wherein the gas mixture is provided from a manufacturing process, a waste

stream, environmental monitoring, or a medical, agricultural, food or beverage operation.